

We claim:

1. An apparatus for measuring motion of a portion of the body of a patient in a magnetic field, comprising:
 - a cradle attached around said portion of the body of said patient;
 - a length of wire having a first end and a second end, said length of wire forming a loop in a central portion thereof, said loop connected around said cradle and thereby encircling said portion of the body of said patient; and
 - a voltage measuring device having a first input connected to said first end of said wire, a second input connected to said second end of said wire, and an output representing the motion of said portion of the body of said patient.
2. The apparatus of Claim 1, wherein said cradle is formed from a thin polycarbonate plastic strip.
3. The apparatus of Claim 1, wherein said length of wire is formed from a high resistance lead.
4. The apparatus of Claim 1, wherein said voltage measuring device comprises:
 - a Faraday shield forming an enclosure;
 - two RF filters mounted in said Faraday shield, each of said RF filters having an input and an output, said inputs of said RF filters forming said first input and said second input of said voltage measuring device, respectively;
 - a differential amplifier mounted within said enclosure and having two inputs and an output, each of said inputs connected to a respective output of one of said two RF filters;
 - a gradient filter mounted within said enclosure and having an input and an output, said input of said gradient filter connected to said output of said differential amplifier, and

means for transmitting an output signal mounted within said enclosure and having an input connected to said output of said gradient filter and an output.

5. The apparatus of Claim 1, wherein said voltage measuring device comprises:

a Faraday shield forming an enclosure and a first input of said voltage measuring device;

an RF filter mounted in said Faraday shield having an input and an output, said input of said RF filter forming a second input of said voltage measuring device;

a differential amplifier mounted in said enclosure and having two inputs and an output, one of said inputs connected to said output of said RF filter and the other of said inputs connected to said Faraday shield;

a gradient filter mounted in said enclosure and having an input and an output, said input of said gradient filter connected to said output of said differential amplifier, and

means for transmitting an output signal mounted in said enclosure and having an input connected to said output of said gradient filter and an output.

6. An apparatus for measuring motion of a portion of the body of a patient in a magnetic field, comprising:

a length of wire having a first end and a second end, said length of wire forming a loop in a central portion thereof, said loop connected around said portion of the body of said patient; and

means for measuring a voltage developed on said length of wire in a magnetic field, said means for measuring a voltage positioned within said magnetic field and having a first input connected to said first end of said wire, a second input connected to said second end of said wire, and an output representing the motion of said portion of the body of said patient.

7. An apparatus for measuring motion of a portion of the body of a patient and an electrocardiogram of a patient in a magnetic field, comprising:
a first ECG electrode attached to said patient;
a first ECG lead having a first end connected to said first ECG electrode and a second end;
a second ECG electrode attached to said patient;
a second ECG lead having a first end connected to said second ECG electrode and a second end, said second ECG lead forming a loop in a central portion thereof, said loop connected around said portion of the body of said patient; and
a voltage measuring device having a first input connected to said second end of said first ECG lead, a second input connected to said second end of said second ECG lead and an output representing the motion of the body of said patient and the electrocardiogram of said patient.

8. The apparatus of Claim 7, further comprising a cradle attached around said portion of the body of said patient between said loop formed by said second ECG lead and said portion of the body of said patient.

9. The apparatus of Claim 8, wherein said cradle is formed from a thin polycarbonate plastic strip.

10. The apparatus of Claim 7, wherein said first ECG lead and said second ECG lead are formed from high resistance leads.

11. The apparatus of Claim 7, wherein said voltage measuring device comprises:

a Faraday shield forming an enclosure;

two RF filters mounted in said Faraday shield, each of said RF filters having an input and an output, said inputs of said RF filters forming said first input and said second input of said voltage measuring device, respectively;

a differential amplifier mounted within said enclosure and having two inputs and an output, each of said inputs connected to a respective output of one of said two RF filters;

a gradient filter mounted within said enclosure and having an input and an output, said input of said gradient filter connected to said output of said differential amplifier, and

means for transmitting an output signal mounted within said enclosure and having an input connected to said output of said gradient filter and an output.

12. The apparatus of Claim 7, wherein said voltage measuring device comprises:

a Faraday shield forming an enclosure and a first input of said voltage measuring device;

an RF filter mounted in said Faraday shield having an input and an output, said input of said RF filter forming a second input of said voltage measuring device;

a differential amplifier mounted within said enclosure and having two inputs and an output, one of said inputs connected to said output of said RF filter and the other of said inputs connected to said Faraday shield;

a gradient filter mounted within said enclosure and having an input and an output, said input of said gradient filter connected to said output of said differential amplifier, and

means for transmitting an output signal mounted within said enclosure and having an input connected to said output of said gradient filter and an output.

13. A method for measuring motion of a portion of the body of a patient in a magnetic field, comprising:

attaching a cradle around said portion of the body of said patient;

forming a loop in a central portion of a length of wire having a first end and a second end;

positioning said loop around said cradle so that said loop encircles said portion of the body of said patient; and

measuring the voltage developed on said length of wire to generate a signal representing the motion of said portion of the body of said patient.

14. The method of Claim 13, wherein said cradle is formed from a thin polycarbonate plastic strip.

15. The method of Claim 13, wherein said length of wire is formed from a high resistance lead.

16. A method for measuring motion of a portion of the body of a patient in a magnetic field, comprising:

forming a loop in a central portion of a length of wire having a first end and a second end;

positioning said loop around said portion of the body of said patient; and

measuring, within said magnetic field, a voltage developed on said length of wire in a magnetic field to generate a signal representing the motion of said portion of the body of said patient.

17. A method for measuring motion of a portion of the body of a patient and an electrocardiogram of a patient in a magnetic field, comprising:

attaching a first ECG electrode and a second ECG electrode to said patient;

connecting a first ECG lead to said first ECG electrode at a first end thereof;
connecting a second ECG lead to said second ECG electrode at a first end thereof;
forming a loop in a central portion of said second ECG lead;
positioning said loop of said second ECG lead around said portion of the body of said patient; and
measuring a voltage developed between a second end of said first ECG lead and a second end of said second ECG lead device to generate a signal representing the motion of said portion of the body of said patient and the electrocardiogram of said patient.

18. The method of Claim 17, further comprising the step of positioning a cradle attached around said portion of the body of said patient between said loop formed by said second ECG lead and said portion of the body of said patient.

19. The method of Claim 18, wherein said cradle is formed from a thin polycarbonate plastic strip.

20. The apparatus of Claim 17, wherein said first ECG lead and said second ECG lead are formed from high resistance leads.